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UNPARALLELED





U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT & ENGINEERING CENTER

Act like someone's life depends on what we do.





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ABRAMS TANKS



- The M1 series Abrams tank is the current Main Battle Tank
- Heavily armored, large caliber gun
- Destroy enemy armored vehicles
- Deployed onto the battlefield to engage/direct fire
- Provides ground superiority to hold a position







UNMANNED AERIAL VEHICLES (UAV)



Fixed Wing

- More efficient/Significantly longer flight time
- Cover more area for ISR
- Cannot loiter as easily

Single Rotor

- Longer endurance over multi-rotor
- Heavier payload capacity if necessary
- More Versatile than fixed wing
- Constant force generation required

Multi-Rotor

- Easiest to fly
- High maneuverability
- Loiter around a location for fixed area ISR







CURRENTLY FIELDED UAVS



MQ-1C Gray Eagle

- Currently in service
- Equipped with Hellfire missiles
- Replaced the Predator drones
- Battalion Asset
- Cannot loiter
- Too fast for Armor Vehicle OpTempo

RQ-11 Raven

- Hand launched
- Waypoint navigation or supervised
- Hard to deploy from armored vehicle









UNMANNED GROUND VEHICLES (UGVs)



Wheeled vehicles

- Low production costs
- Repair/Simplicity
- Lower impact on infrastructure



Tracked

- Traction ground impact
- Mobility/Versatility
- Can keep tempo with Armored Vehicles







UNMANNED ASSETS WITH ARMORED VEHICLES



- Intelligence, Surveillance, and Reconnaissance (ISR)
 - Target Detection/Recognition
 - Battle Damage Assessment
- IED Defeat
 - Route Clearance
 - Road side bomb trigger
- Remote breaching operations
 - Obscuration
 - Lane clearing (MICLIC Launcher)
 - Lane proofing/marking
- Mobile RWS
- Persistent Smoke Generation









POTENTIAL SCENARIOS



- ISR
 - Spot enemy in defilade
 - UAV or UGV
- ATGM team spotted and engaged
 - Combat UAV (UCAV)
 - Mobile RWS
- IED Detection
 - UAV with Thermal Sight
- Route Clearing
 - Tracked APC equipped with plow
- Persistent Smoke Generation
 - UGV with Smoke Generator

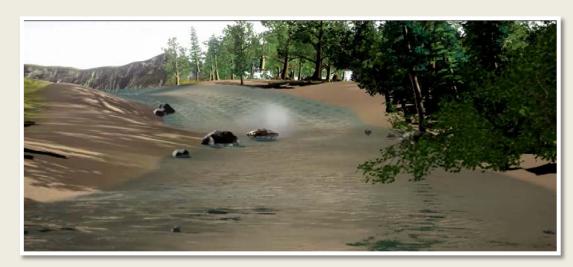




UGV SMOKE GENERATOR



- UGV In Position
- UGV Deploy Smoke
- Can be used for
 - Cover
 - Deception
 - Breaching Obscuration
 - SOSRA









LOADERS STATION - CONCEPT



UxV Controller

- Map of area
- Video feed from UxV
- Toggle switch/button
- Man portable and platform agnostic





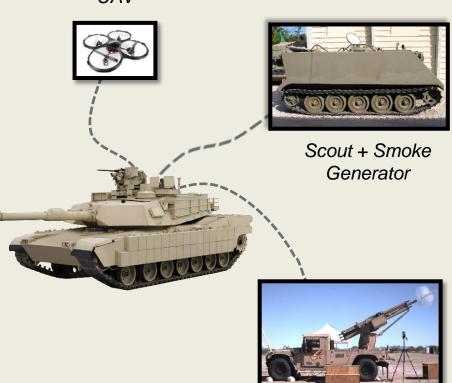




ALE PHASE I







Robotic HMMWV Mortar System

Purpose:

 Demonstrate the value of unmanned assets within an Armored Brigade Combat Team

Product:

- Integrate supervised-autonomy capability onto a UGV
- Integrate UxV OCU mount into Abrams Loader station
- UGV to address capability gap for persistent smoke
- Utilization of UAV to provide ISR and battle damage assessment

Payoff:

- Testing will demonstrate the deliverable of persistent smoke to obscure an armored vehicle from OPFOR positions
- Follow-on phases to increase lethality and extend fire control system





FUTURE PHASES



- Extend range of platform's fire control
 - Laser rangefinder
 - Laser designator
 - Downrange Met. Sensor
- Extend range of Armor Unit's lethality/sphere of influence
 - Mount UxVs with Weapon Systems
 - Increase situational awareness
- UAV with increased flight time
- Increase Engineering Asset survivability







- ALE clearly illustrates the Man-Unmanned Teaming benefits
 - Increase stand off distance
 - Increase lethality, LOS, SA
- ALE Demonstration & Future Phases
- Currently Fielded UAVs Fixed Wing
- Platform agnostic

